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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor: Joshi et al.
Serial no.: 10/541,011
I.A. Filed: December 29, 2003
Title: ENHANCED GENERATION OF HYDROXYL RADICALS
Examiner: Edna Wong
Art Unit: 1753

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Response and Amendment

This response and amendment are in reply to the office action mailed on November 21, 2006. Attached is a three month petition for extension of time to submit this response. As such, this response is timely submitted.

Claim Amendment

Claims 1, 6, and 7 have been amended to render the claims definite, and distinctly claim the subject matter of the instant invention.

Specification Amendment

Paragraphs at page 1, lines 10 to 24 and page 7, line 20 to 25 have been amended per the examiner's request to correct spacing issues.

Response to Cited References

The Examiner cites CS 274995 (hereinafter "'995") and US 6,793,903 (hereinafter "Parrish") as depriving claims 1-17 of inventiveness.

As mentioned by the Examiner, '995 teaches of the generation of hydroxyl radicals in aqueous mixtures. However, the material disclosed therein is fundamentally different from the present invention. '995 mentions several catalysts (Fe+2, Cu+2, and Ni+2), not including MgO, which is essential to the present invention (see, for example, the first paragraph of the detailed description on page 5).

Parrish teaches of high temperature decomposition of hydrogen peroxide, and mentions several catalysts (column 3, lines 27-35). The preferable catalytic coatings,

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according to Parrish, are Fe(II), Fe(III), Cr(III), Cu(II), Pt black, Ag, and Pd (see column 3, lines 27-31). MgO is mentioned only as an additional catalyst that may be used (column 3, line 35), and no special traits thereof are mentioned. Furthermore, the catalytic coatings referred to in Parrish are optional (see column 3, lines 35-39).

Since neither '995, nor Parrish, point to the special characteristics of MgO, which are at the base of the instant invention, those two publications cannot be deemed as depriving the instant application of inventiveness.

Moreover, Parrish is not relevant to the field of the instant invention. Parrish refers to a gas phase reaction, while the instant invention refers to an aqueous liquid phase reaction. Therefore, no one skilled in the art would refer to Parrish when contemplating the instant invention.

Furthermore, Parrish mentions Fe(II) and Cu(II) as preferable catalysts. Those catalysts are mentioned in '995 as well, so that any person familiar with the art following '995 would use either Fe(II) or Cu(II), rather than using MgO which is not mentioned as being preferable by Parrish, and is not mentioned at all in '995.

Additionally, there are several other differences between Parrish, and the instant application:

a) The Examiner mentions that Parrish teaches that high concentrations (over 50%) of H₂O₂ are unstable at high temperatures. However, this is irrelevant to the present invention in which high temperatures are not required. Parrish teaches of high temperature decompositions of hydrogen dioxide on a surface, which is not related at all to the present invention, teaching of enhanced generation of hydroxyl radicals in a solution using MgO as a catalyst, and not requiring high temperatures at all. Therefore, a person skilled in the art would not learn from Parrish of the instant invention.

b) The Examiner asserts that the concentrations of MgO mentioned in claim 7 of the instant invention could be used by Parrish as well. However, as mentioned hereinabove, Parrish relates to the decomposition of H₂O₂ in gas phase on heated surfaces, so as to produce hydroxyl radicals, wherein the instant invention relates to the production of hydroxyl radicals in a solution. The MgO concentrations referred to in the instant invention are not comparable to the ones used by Parrish. The present invention uses 10-250ppm of suspended MgO, which is, as a skilled person would appreciate, immediately converted in water to magnesium hydroxide. The present invention also uses 10-250ppm liquid peroxide. Parrish, on the other hand, has zero concentrations of both of those components, since the MgO used therein

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is solid surface MgO, and the peroxide is immediately converted to gas radicals.

The Examiner states that "it would be obvious to add a concentration" of said MgO (page 8, line 1). We respectfully disagree. Parrish does not teach of any MgO additions, at any concentrations, as mentioned above, since the term "concentration" has nearly no meaning in the context of Parrish.

In summary, since in Parrish the catalyst MgO is coated upon a surface and the reaction is in the gas phase, and in the instant invention the MgO is suspended in a solution, there should be no comparison between the two.

Furthermore, The Examiner states that a prima facie obviousness may be established for the use of MgO. We respectfully differ, because as required in MPEP §2144.08, it is essential to find some motive or suggestion to make the claimed invention in light of the prior art teaching. Nobody, and still less a skilled experimenter, would expect that conditions selected for high temperature reactions in gas phase would be suitable for room temperature reactions in water, let alone if the two processes have totally different goals, the former removing nitric oxide from gases, the latter removing organic acids from waste waters. Said paragraph 2144.08 further requests that the differences between the prior art and the claims at issue be ascertained, and predictability of the technology be considered; the difference between solid surface and water dispersion, for MgO, disables any predictability, as well as the difference between unstable gas and stable solution, for peroxide.

c) The Examiner asserts that the concentration of H_2O_2 , as claimed in claim 8, would have been obvious to an artisan following '995 and/or Parrish. Applicant respectfully disagrees. Parrish mentions that high concentrations (over 50%) of H_2O_2 are unstable at high temperatures. This is irrelevant to the instant invention, which does not relate to high temperatures, and, further, relates to relatively low concentrations of H_2O_2 , namely 10-50 ppm.

d) The Examiner notes (page 12, point (i)) that the invention disclosed in '995 inherently has an amount of radicals in an amount sufficient for oxidation, as does the present invention. However, the presence of radicals cannot make two inventions equivalent; both cited documents, as well as the instant application comprise radicals. In Parrish those radicals as created in the gas not the liquid phase, and in '995 the radicals are created in a different system, lacking the catalyst of the instant invention. Thus, the only connection that can be made between those three documents is in hindsight.

The Examiner further cites DD 51638 in combination with '995 and Parrish, as depriving claim 18 of inventiveness. Applicant respectfully submits that claim 18 is dependent from claims 1, 11, and 17, thus, if those claims are deemed inventive, claim 18 should be deemed inventive as well, in the context of the instant application. It should be noted that this argument is true for all dependent claims in the instant application.

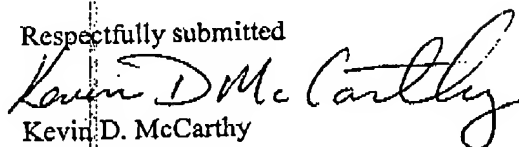
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Conclusion

The Applicant respectfully submits that, following the amendments of the claims and the specification, and in light of the above explanation, the instant application should be held allowable.

Respectfully submitted



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Petition for extension of time